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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/842,631

04/27/2001

Wendong Zhen

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11/18/2003

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EXAMINER

DIAZ, JOSE R

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/842,631

Applicant(s)

ZHEN, WENDONG

Examiner

José R Díaz

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23, 24, 28 and 30-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23, 24, 28 and 30-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 15.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to an amendment filed August 26, 2003 on which Applicant amended Claims 23, 28, and 32. Upon a carefully review of the prior art, Examiner considers that the references Shimada et al. (US Pat. No. 6,033,920), Suzuki (US Pat. No. 6,151,240) and Ogata et al. (JP 10-321809), cited in the previous Office Action, read over the claimed limitations. Furthermore, the indicated allowability of claims 30-36 is withdrawn in view of the rejections presented in this Office Action. Therefore, this Office Action is made Non-Final.

Information Disclosure Statement

2. The information disclosure statement filed April 20, 2003 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

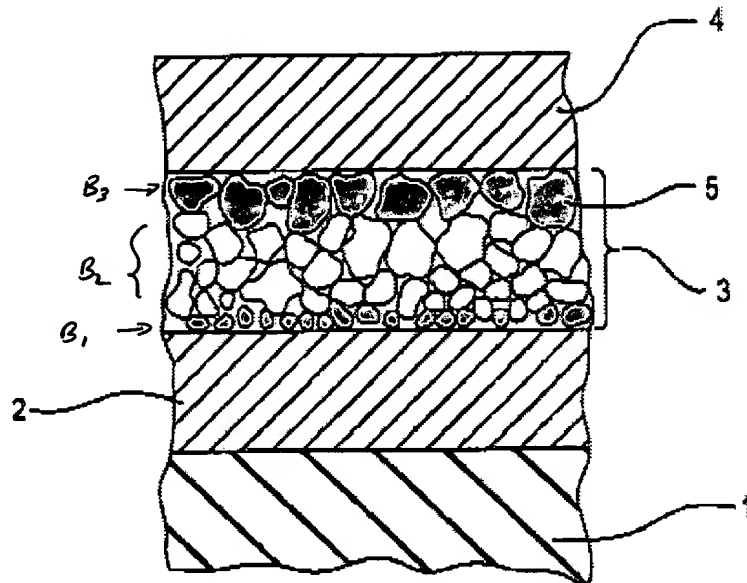
4. Claims 23 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Shimada et al. (US Pat. No. 6,033,920).

Regarding claims 23, Shimada et al. teaches a lower electrode (2) (see fig. 7) laminated on one side to a substrate (1) (see fig. 7), a ferroelectric thin film (3) constructed of at least three layers (see fig. 7) including a lowermost layer (B₁) (see figure below), an intermediate layer (B₂) (see figure below), and an uppermost layer (B₃) (see figure below); and an upper electrode (4) only being directly laminated, on one side, to said uppermost layer (B₃), so that said intermediate layer (B₂) does not directly contact either said lower electrode (2) or said upper electrode (4) (see fig. 7), wherein the crystal grain of the lowermost layer (B₁) is smaller than the crystal grain of the intermediate layer (B₂) (see figure below).

Regarding claims 28, Shimada et al. teaches a lower electrode (2) (see fig. 7) laminated on one side to a substrate (1) (see fig. 7), a ferroelectric thin film (3) constructed of at least three layers (see fig. 7) including a lowermost layer (B₁) (see figure below), an intermediate layer (B₂) (see figure below), and an uppermost layer (B₃) (see figure below); and an upper electrode (4) only being directly laminated, on one side, to said uppermost layer (B₃), so that said intermediate layer (B₂) does not directly contact either said lower electrode (2) or said upper electrode (4) (see fig. 7), wherein the crystalline nucleus density of the lowermost layer (B₁) is higher than those of the

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intermediate layer (B_2) (see figure below), and an uppermost layer (B_3) (see figure below).



Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

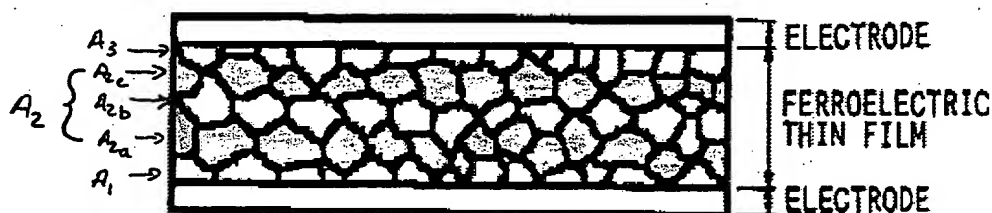
6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

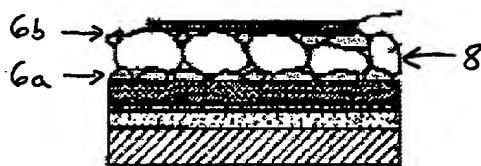
7. Claims 23-24, 28, and 30-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (US Pat. No. 6,151,240) in view of Ogata et al. (JP 10-321809).

Regarding claims 23-24, 28, and 30-36, Suzuki teaches a lower electrode (consider the "ELECTRODE" under the ferroelectric thin film in fig. 7) laminated on one side to a substrate (1) (see abstract), a ferroelectric thin film ("FERROELECTRIC THIN FILM") constructed of at least three layers (see fig. 7) including a lowermost layer (A_1) (see figure below), an intermediate layer (A_2) (see figure below), and an uppermost layer (A_3) (see figure below); and an upper electrode (consider the "ELECTRODE" above the ferroelectric thin film in fig. 7)) only being directly laminated, on one side, to said uppermost layer (A_3), so that said intermediate layer (A_2) does not directly contact either said lower electrode or said upper electrode (see fig. 7). Furthermore, Suzuki teaches a ferroelectric film having five layers: a lowermost layer (A_1), an uppermost layer (A_3), and three intermediate layers (A_{2a} , A_{2b} and A_{2c}).



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However, Suzuki fails to teach that the crystal grain of the lowermost layer and/or the uppermost layer is smaller than the crystal grain of the intermediate layer. Ogata et al. teaches that it is well known in the art to form a ferroelectric film having crystal grains of the lowermost layer (6a) and/or the uppermost layer (6b) smaller than the crystal grain of the intermediate layer (8) (see fig. 1d, below).



Suzuki and Ogata et al. are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form a ferroelectric film having crystal grains of the lowermost layer and/or the uppermost layer smaller than the crystal grain of the intermediate layer. The motivation for doing so, as is taught by Ogata et al., is suppressing the leakage current (paragraph [0026], English translation). Therefore, it would have been obvious to combine Ogata et al. with Suzuki to obtain the invention of claims 23-24 and 28.

Response to Arguments

8. Applicant's arguments with respect to claims 23-24, 28, and 30-36 have been considered but are moot in view of the new ground(s) of rejection.

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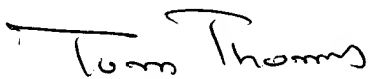
Correspondence

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD


TOM THOMAS
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TECHNOLOGY CENTER 2800